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The Antique Wireless Association of
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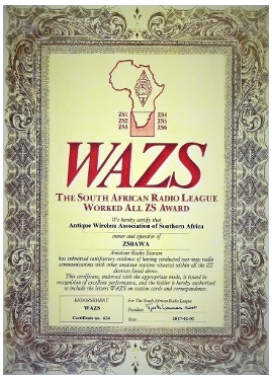

Inside this issue:

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Reflections:

Welcome to 2022.

A year that is bound to be filled with surprises, be they pleasant or bad. Be they uplifting or break your heart. They will be there.

The only way we will survive them all will depend on our how we tackle them.

Personally, for me, it will more than likely be head on, either to face them as they come, or be annihilated in the process.

Lets hope that does not happen, but I certainly do not want to be taken down by the world and its process of elimination.

I am still so often in two minds as to whether I need to start working on a brand new collection of boat anchors, or to try and resist the temptation. I must admit, it's so much worse than a chocolate craving which makes it so very hard to resist.

Every time I look at some of the radios that come up for redistribution (not without compensation), I get such a craving.

Then to hear of how many people have their little projects going and how they are looking for components, well then my brain goes into a flat spin.

Oh how I would love to have one of those again. What would it take to get one of them ? How much am I prepared to spend on getting something going again (that's always the killer).

But then something comes my way and I just can't resist any more. It's like I hear so many people say on our groups "Look what followed me home".

Is this some kind of low level addiction I wonder ? Seems to me like anything is possible at this stage.

But now, the year is still very young and I am sure its going to take a while to decide on taking the plunge or not. I mean we have another 365 days ahead to get it all together. (It's not a leap year is it ?).

I'm sure there will be many radio's that will change hands again this year. Many will go to good homes and be saved from the scrap heap. Many will be stripped down for parts to restore others in not so bad a condition. Many will already be in a good condition to be switched on and used immediately.

Whatever the case may be, I am sure there will be lots of movement out there and if that is one way to beat the blues of expectancy, then that's what we need to be doing.

Who needs to bother about the bad things in life when there is so much good to be had by restoring old radio's ?

Who needs to bother about facing things head on, when we can just pick them up and go ?

Ok, Guess I 've talked myself into this one. See you at the next flea market to collect some goodies.

Best 73

DE Andy ZS6ADY

Wikipedia

Solar cycle:
The cycle's physical basis was elucidated by George Ellery Hale and collaborators, who in 1908 showed that sunspots were strongly magnetized (the first detection of magnetic fields beyond the Earth). In 1919 they showed that the magnetic polarity of sunspot pairs:

- Is constant throughout a cycle;
- Is opposite across the equator throughout a cycle;
- Reverses itself from one cycle to the next.

Hale's observations revealed that the complete magnetic cycle spans two solar cycles, or 22 years, before returning to its original state (including polarity). Because nearly all manifestations are insensitive to polarity, the "11-year solar cycle" remains the focus of research; however, the two halves of the 22-year cycle are typically not identical: the 11-year cycles usually alternate between higher and lower sums of Wolf's sunspot numbers (the Gnevyshev-Ohl rule).
In 1961 the father-and-son team of Harold and Horace Babcock established that the solar cycle is a spatiotemporal magnetic process unfolding over the Sun as a whole. They observed that the solar surface is magnetized outside of sunspots, that this (weaker) magnetic field is to first order a dipole, and that this dipole undergoes polarity reversals with the same period as the sunspot cycle. Horace's Babcock Model described the Sun's oscillatory magnetic field as having a quasi-steady periodicity of 22 years.[2][6] It covered the oscillatory exchange of energy between toroidal and poloidal solar magnetic field ingredients.

The missed opportunities by Richard Dismore F4WCD/ZS6TF

The author's attention was drawn recently to a letter entitled "Drift cancelling oscillator" written by an American JAL (Jim) McLaughlin published in QST in 1958**[1]**. It states that the drift cancelling system "claimed to have been developed by T.L.Wadley of South Africa" (McLaughlin's words) had been "invented" four times, and that it was himself that first developed it in 1942. Concurrently, more information has emerged concerning the French development which caused Racal to adopt a strategy of non-disclosure in the early years of RA17 production. This article revisits the precursors of that decision in an effort to understand what transpired.

McLaughlin was employed by Hallicrafters before WW2 and was a co-designer of a diversity receiver system. He became a freelance consultant often retained by Hallicrafters. **[2]** Before America's entry into WW2 in December 1941, he was deployed by the FCC and OSS(US Office of Strategic Services) on enhancements to production receivers for surveillance purposes and produced add-on units to modified SX28's and AR88's called the "Heterodyne eliminator" which sat on top of the receiver.

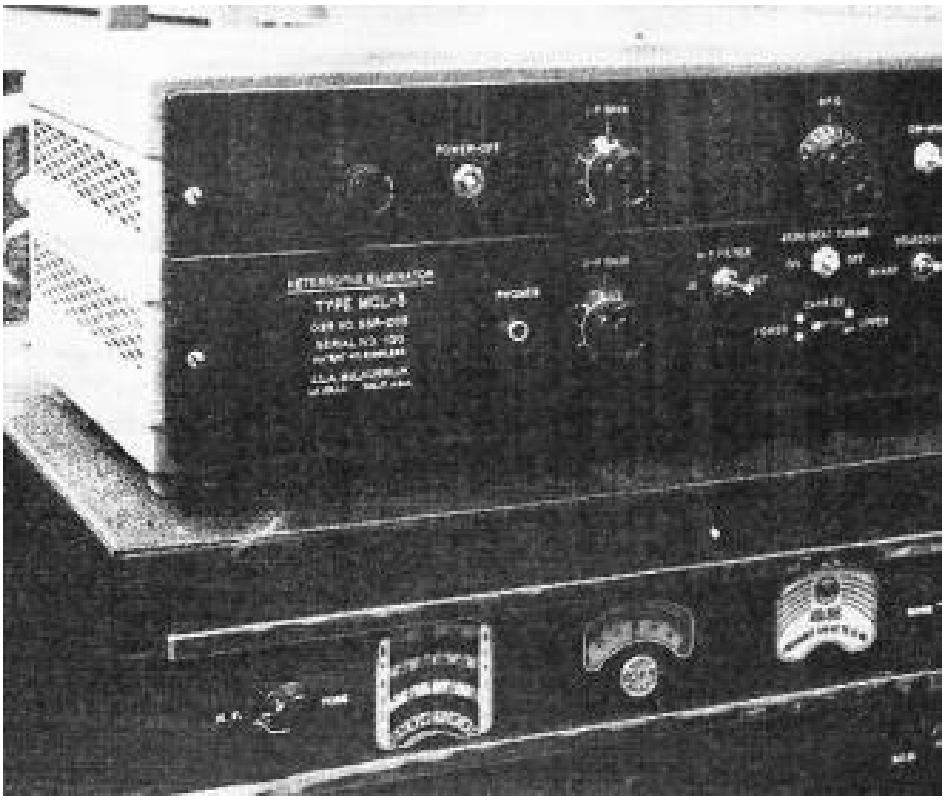

Figure 1.The "Heterodyne Eliminator" built for the OSS for wartime radio intelligence work.

The system eliminated heterodynes from unwanted carriers adjacent to the signal of interest and required more stable mixer oscillators than provided in the standard receiver designs, hence the need for modifications. The system was patented in 1941 and details published in QST**[3]**. However details of the receiver modifications were not, and McLauglin must be given the benefit of doubt that he used a "sum an difference" drift cancelling circuit. The opportunity was missed to patent the technique and base a new receiver design upon it.

In 1947 Collins announced through an IRE advertisement the "exclusive" design of the "Drift cancelling Oscillator" as applied to their 51M-2 VHF aviation ground receiver.

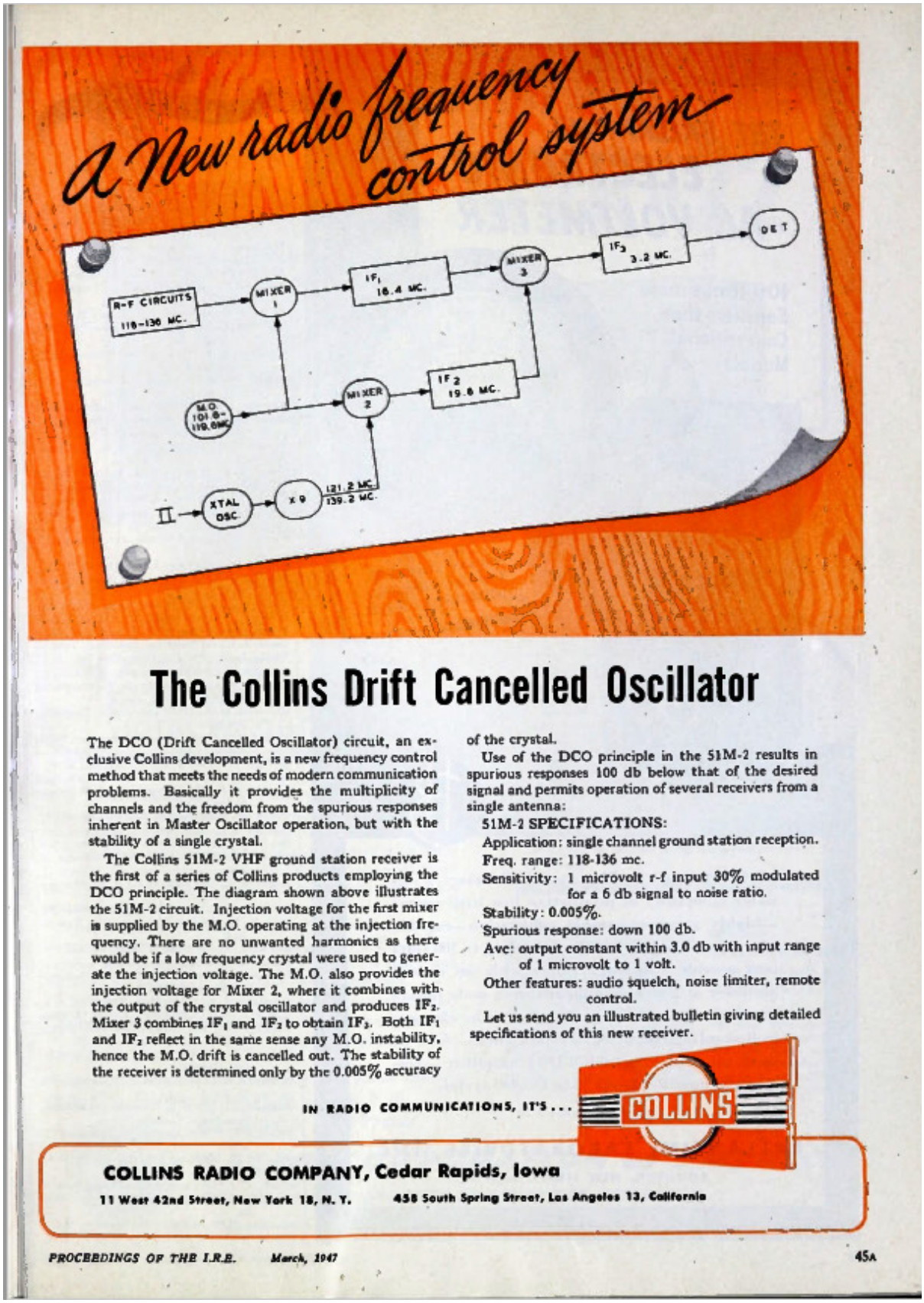

Figure 2. The Collins Drift Cancelled Oscillator development

It is not known whether Collins was aware of the 1944 Colas-CSF French patent for such a system, or what went on between the companies, but the announcement may have prompted CSF's US patent in 1952**[4]** citing the 1944 patent as precedence. This was necessary as CSF launched a receiver using the drift cancelling technique in the same year. The receiver was aimed at the military and diplomatic market with possible sales to France's WW2 allies.

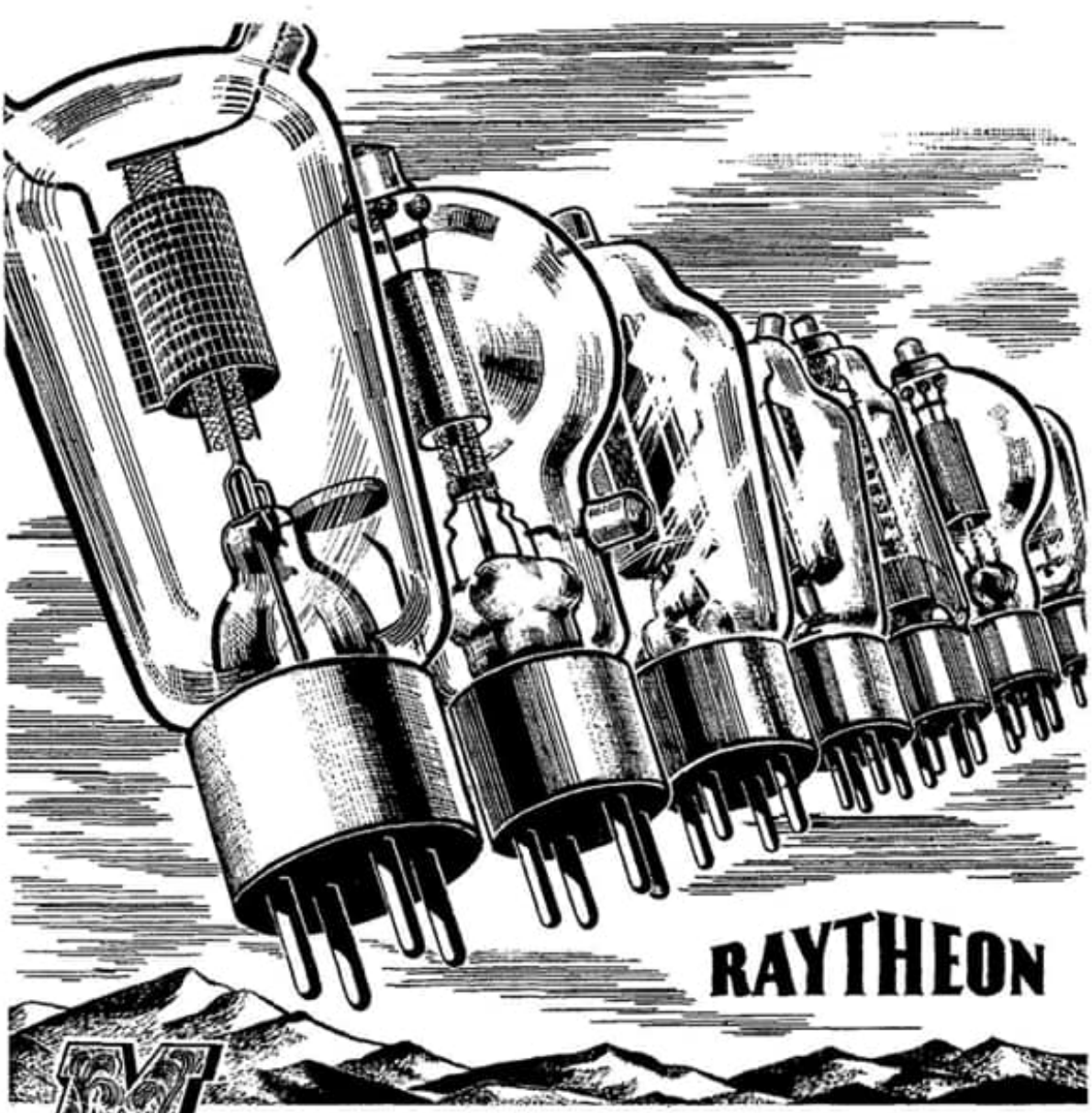

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Figure 3. The CSF RS550 2-30 MHz Receiver

A contemporary English language brochure depicts the receiver in use in such applications.

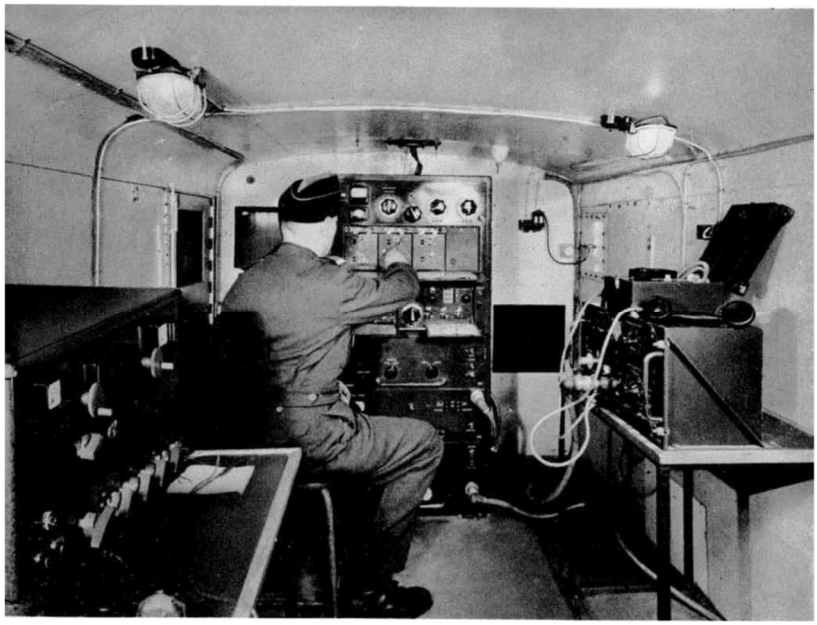

Figure 4. The RS550 Receiver in military mobile use

A small digression on the subject of patents becomes necessary at this point. The altruistic origins of patents were based on the natural right of the inventor (fundamental justice) to have the intellectual property of his endeavours protected for a period, from exploitation by others, and the economic justification, that patent rights given by the patenting state is one from which the public and the country should benefit. Patents therefore are necessarily part of a legal system and attorneys are the only people qualified to draft them. This imposes costs upon society and the applicant so it became an expensive process to implement and prosecute. With the emergence of the fast moving technology of radio in the 20th Century, came an upsurge in patent litigation and even the Great Marconi who beat competitors over the head with his patent 7777 of 1900 to retain his supremacy over the early developments of radio transmission, was stripped of some of his patents. It became practise for corporations to require cession of patent rights in employment contracts, and "tactical" patenting of improvements to existing patents was aided and abetted by some states, particularly after the exceptional rate of technological progress by the end of WW2 and beyond.

The subject of provisional patents is an example designed to enhance a country's competitive advantage. Such patents were not provided for in UK legislation where full disclosure was required at the outset, but they were allowed in the United States with limited disclosure and allowed for up to 12 months with complete secrecy in South Africa.

The "head" South African patent held by the CSIR**[5]** has a precedence date of 21/3/1950 and It would have remained secret until publication on 3/3/1951. 1952 marked the production of the CSF RS550 receiver in France for deployment to state agencies, nearly 8 years after the precedence date of the CSF French patent. This patent was applied for in the US on March1946 but only granted in January1952, literally just in time, but the precedence date of the original French patent in 1944 applied reflecting the rules on patents. Meanwhile Wadley presented his paper to the SAIEE on 11th July 1953, where his prototype and the SMD copy were demonstrated, so the embodiment of the RSA patent was exposed to a select group (the SAIEE) at that time. Subterfuge was at play because most of the audience were confused about the principle of what was being presented. Had it come to the attention of CSF, the worst case scenario would have been the registration of a South African patent on the same basis as the US one but it seems they remained unaware of Wadley. Likewise Wadley was unaware of the French patent otherwise the CSIR's only option would have been to patent an improvement to it, and it would have been a reference in his paper.

Patents can be overturned if there are precedents in the public domain independent of the inventors work, or if private date controlled documentation can be validated. The CSIR was legally constituted on 5th October 1945 so defence on that basis against the French patent would have been impossible. The earliest official internal document relevant was the report on the Ionosonde dated July 1947**[6]** in which the electronic switching of heterodyne oscillators in 1 MHz steps using a crystal derived comb generator was first recorded.

How good was the French patent? The answer, since it was never put to the legal test, was that it was thought good enough to cause disruption of the RACAL project. Figure 1 from the patent below shows the crystal based harmonic generator, ***Q*** & ***A1***, ***I*** the interpolation oscillator between the adjacent harmonics presented by the filter amplifier ***MF1***. After the third mixer conversion ***C3***, the term ***H*** and hence its drift was eliminated from the system.

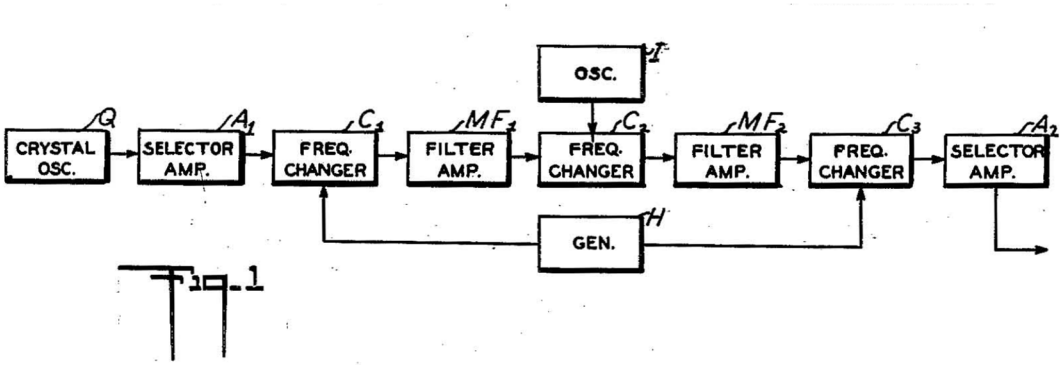

Figure 5. Figure 1 from the US/CSF-Colas patent.

The text contained the supporting equations with worked examples. Although these were down conversion examples, the generality of the text was retained.

How good was the French receiver built on the principle? The RS550 built by CSF who later merged with Thompson, pre-dated the RA17 by 2 years and differed from it in many ways. It was a quiet receiver with good suppression of unwanted signals and spurii with excellent frequency stability. Its confinement to down conversion caused the lower end of the tuning range to be restricted to 2 MHz. The coarse tuning steps were 100kHz requiring mechanical band switching in n 4 octave ranges (2–4, 4–8, 8–16, 16–30 MHz). The operator frequency interface was superficially similar to the Collins R390A, a complex mechanical design akin to an electricity meter mechanism, which to stay in step relied on linearisation of the interpolating oscillator tuning capacitor using peripheral adjustment screws on a metallic disc on the capacitor shaft. It was a heavyweight at 75kg with an external power supply unit.

In contrast, the Wadley prototype must have been seen by the Admiralty as a jewel at first sight when shown to them by Wadley's boss Hewitt in 1954. By then The Admiralty's experts would have known chapter and verse about the CSF receiver, a beautifully made dinosaur in comparison. It was more suited to a fixed link application, whereas the frequency agility afforded by Wadley's electronic band switching made it highly suitable for surveillance and its, stability from cold switch-on, long term freedom from drift, and repeatability of the design were major benefits.

Figure 6. One of the two prototypes constructed by Trevor Wadley at the TRL of the CSIR.

The collaboration that followed fast tracked the design into a 19 inch rack chassis with the now famous film scale and production commenced towards the end of 1954. To obtain a measure of protection, the CSIR took out a patent in the United Kingdom for an improvement of their original South African patent granted in September 1954. The strategy of non-disclosure of core

principles, aided by placing the radio under the official secrets act, facilitated the rundown of the clock on the CSF patent. Exactly when CSF became aware of the RA17 is not apparent but when they did there was no commercial incentive to take action as their technology had taken a different direction, noting that Britain, France, and the US were on the same side in the cold war. Events went full circle in 2000**[7]** when Sir Ernest Harrison CEO of RACAL sold his shares in the company to Thompson -CSF for £25M as part of a £1.3 billion takeover of the defence electronics part of RACAL.

Conclusion

The slightly uncomfortable cooperation between the technology arm of the pariah apartheid state, with the British Admiralty and two entrepreneurs with Wadley as the central link pin resulted in the creation of one of the world's most iconic professional receivers running to a production of more than 20,000 units. It helped maintain GB's edge on intelligence in the special relationship with the USA and set Racal on a steep growth path the like of which had not been seen before in a technology enterprise. The patents associated with Wadley owned by the CSIR continued to be licensed to third parties after he resigned in 1964 with the Barlow Wadley XCR and the Yaesu FRG7 in the domain of radio receivers being popular examples.

Footnotes

The author first saw and handled the RA17 with great admiration, on the RACAL stand of the Earls Court Radio Show in 1963. It was teamed up with the RA66B Panadapter which could display up to 500kHz either side of the centre frequency. By then RACAL was marketing the system commercially. The fact that IF signals were brought out to plugs and sockets in the original RA17 concept must hark back to Wadley's scratchbuild of a panadapter in 1941**[8]** (and its limitations).

Secondly, the Wadley prototype has M/cs on the left and k/cs on the right, the more natural way since only 11% of the population is left handed. One of the criticisms of the Americans was that the RA17 was the other way around. The author would like to know why?

Acknowledgements

Figure 3 John Graham RS86946 and key links to reference material.

This article was first published in VMARS Signal magazine No 61, November 2021.

References

[1] QST. Technical correspondence. September 1958 pp 24-25. J.L.A. Mc Laughlin.

[2] Private letter HL "Chad" Chadbourne to James Miller of HRO fame 11November 1976 in reply to the latter's enquiry about Mc Laughlin

[3] "Exit Heterodyne QRM" article October 1947 QST J. L. A. McLaughlin

[4] US patent 2582768 January 15 1952 with precedence to July19 1944 from French patent 658159."Frequency Transposing Device" Inventor Marcel Colas assignee Compagnie Generale De Telegraphie Sans Fil, France

[5] SA patent No. 6043/51 Valve generating circuits; radio receiving systems; generating oscillations. SOUTH AFRICAN COUNCIL FOR SCIENTIFIC & INDUSTRIAL RESEARCH. March 13, 1951 [March 21, 1950].

[6] Report 621.396.91.087.5:551.510.535. CSIR Pretoria Telecommunications Research Laboratory. "A single Band Ionosphere recorder" covering the range 0.1 to 20 Megacycles per second. T.L.Wadley.

[7] The Times, Sunday, April 27th 2008.

[8] Signal issue 51, The Wadley masterpieces" page 4 reference **[5]** RJ Dismore

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Replacing Resistance Line Cords – Gary Albach

In the previous issue of Canadian Vintage Radios (October/November 2021) I presented the circuit for a vintage capacitive touch relay. This old antique used a line cord with a third wire of high resistance to drop the line voltage down to the value required by the filament heater. Hence the name 'resistance line cords' and many of our old 'AA5' style radios from the 1930s also used these resistive cords. Over the years these line cords have dried out, become brittle, and are now fire hazards. They require replacing with modern components and I will give examples of methods we can use today to replace these old line cords.

(Actually, these old cords were always fire hazards, even in the 1930s. They got quite warm and were often curled up behind the drapes. Hence their name 'curtain burners'!)

Today we can replace a resistance line cord with a conventional two wire (polarized) cord and have three choices to drop the voltage to the heater string in the radio. These choices are: 1) a power resistor, 2) a diode, or 3) a capacitor.

A power resistor is a brute force solution that dissipates excessive heat in the radio and can be avoided. For example, a typical heater string and dial lamp from an AC/DC radio of the 1930s draws 0.3A with a total drop of 75V. For operation at 124VAC the resistance of the dropper resistor would need to be (124V – 75V) / 0.3A = 163 ohms. This would dissipate (124V – 75V) x 0.3A = 15W inside the radio, an unnecessarily high value.

Using a diode and a resistor in series with the heater string reduces the size of the dropper resistor because only the positive half cycles get through to the heaters. From the above example, with a little arithmetic, the dropper resistor would be 42 ohms and dissipate 3.8 watts. Better than the 15 watts without the diode, but still quite high. If the pulsating DC through the heaters produces noise in the radio, a 0.022uF Class X capacitor across the diode may reduce the noise.

The solution that dissipates the least power is a capacitor in series with the filaments. In fact, because the voltage and current are out of phase in the capacitor, it dissipates no power at all. To calculate the value of the capacitor in the above example, we first calculate the AC voltage across the capacitor with a line voltage of 124VAC and a filament string voltage of 75V, then calculate the capacitive reactance needed to give 0.3A through the filaments, and finally the capacitance at 60Hz. It looks like this:

Vc = voltage across the capacitor = [(Vline)**2 – (Vfilament)**2]**1/2
= (124**2 – 75**2)**1/2 = 98.7V.

Xc = capacitive reactance = Vc/I = 98.7V / 0.3A = 329 ohms

f = line frequency = 60Hz.

C = 1 / (2πfXc) = 1 / (2π x 60 x 329) = 8uF

AC motor-start capacitors in the range 1 – 10uF with working voltages above 250VAC are readily available at reasonable prices. Typically, a 100k ohm/0.5W resistor is placed across the capacitor to discharge it when the power is off, and a 10 ohm/2W resistor added in series as surge protection when the filament is cold.

A more detailed explanation of these options can be found here:

https://www.vintage-radio.com/repair-restore-information/valve_dropper-calcs.html

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Mission Statement

Our aim is to facilitate, generate and maintain an interest in the location, acquisition, repair and use of yesterdays radio's and associated equipment. To encourage all like minded amateurs to do the same thus ensuring the maintenance and preservation of our amateur heritage.

Membership of this group is free and by association. Join by logging in to our website.

Notices:

Net Times and Frequencies (SAST):
Saturday 07:00 (05:00 UTC) —Western Cape SSB Net— 3.640
Saturday 08:30 (06:30 UTC)— National SSB Net— 7.125; Sandton repeater 145.700
Echolink—ZS0AWA-L; ZS6STN-R
Relay on 10.125; 5.380 and 14.135 (Try all and see what suits you)
Saturday 14:00 (12:00 UTC)— CW Net—7025

AWASA Telegram group:

Should you want to get on the AWA Telegram group where a lot of technical discussion takes place, send a message to Andy ZS6ADY asking to be placed on the group. This is a no-Nonsense group, only for AWA business.
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For Sale:
Two vintage receivers for sale:
Radios have settings for 110/120/220/240VAC
Ecko is fully complete but when turned on the back central valve glows then dies away.
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